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ABSTRACT

An attempt was made to train nine severely mentally retarded children to be more effective communicators within a referential communication paradigm. The researchers sought, too, to examine the importance of three skills involved in formulating an effective message: coping with referents similar to the nonreferents, comparison skills, and ability to transmit a message. The investigation used a store game task and was divided into five phases, including a familiarization task phase, two training phases, and a near generalization phase. Modeling and feedback were used in all training conditions. Interactions between dyads were videotaped. Analysis of communication frequency and accuracy data revealed that Ss receiving both comparison and message formulation training had the largest gains in communication accuracy following training and also demonstrated impressive increases in communication frequency. Performance of Ss receiving only comparison training did not improve as much as the comparison and message training Ss. Results suggest that Ss learned transferable communication behaviors. (CL)

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TRAINING REFERENTIAL COMMUNICATION SKILLS IN THE SEVERELY MENTALLY RETARDED

FINAL REPORT

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Introduction

The failure to develop adequate communication skills has been identified as a behavioral characteristic of mentally retarded individuals (Grossman, 1977). They frequently have difficulty transmitting a message about an object or event (Longhurst, 1972). This difficulty has been indicated by a higher than normal incidence of communication disorders in the mentally retarded population (Keane, 1972). However, the specific nature of these deficits has not been adequately investigated.

The objective of this study is to identify the specific nature of the deficiencies in the communication skills of the severely retarded and determine whether these can be improved by teaching them components of the communication event. Before addressing this objective directly, several general issues concerning language and communication in nonretarded individuals will be discussed. To begin, the significance of communicative competence, relative to its relationship to language acquisition in general, will be discussed. This will be followed by a discussion of a paradigm (referential communication) that has proven to be useful in the study of communication skills. A description of the various theoretical models adopted to explain this type of communication will then be provided. The components of the referential communication event that relate to the role of the speaker will then be outlined and the laboratory research concerning these components reviewed. The laboratory

studies will then be compared to research conducted in natural settings and the factors which lead these two approaches to different conclusions concerning the development of communicative competence will be discussed. In the last section of this review, research relevant to language development and communicative competence, as they relate to the mentally retarded, will be discussed. This will include a description of various training techniques that have been found to be effective with the severely retarded. Finally, the specific questions concerning the components of referential communication and training these components with the severely mentally retarded will be presented. The issues to be studied include determining the components of referential communication that are necessary for effective communication and training severely retarded children to be more effective communicators by teaching them to perform the critical components of the communication event.

A Model of Language Development

The acquisition of communicative competence does not occur in isolation of other abilities. Therefore, an adequate understanding of communicative competence necessitates a general discussion of language development. The model of language development adopted for this discussion was proposed by Bloom and Lahey (1978). They defined language acquisition as the development and integration of three language dimensions: content, form, and use.

Language content refers to the underlying meaning of the

message. It represents the general categorization of particular language topics. A topic is a specific idea encoded in a particular message. This may be a reference to a particular object (a spoon), a particular action (eating), or a particular relation (possession, Johnny's plate). Language content is the broad categorization of topics as objects (spoon, hat, shoe), actions (eating, sitting, throwing), or relations (Johnny's plate, cake gone, big boy). Therefore, Johnny's plate may be the topic of a message but the content of that message refers to the concept category of possession relation. The content dimension provides a parsimonious explanation of the similarities in language acquisition among children with differing language experiences. While children may differ in the topics they talk about, they learn to talk about objects, actions, and relations between objects and events in a similar manner (Bloom & Lahey, 1978).

Language form consists of a repertoire of linguistic units and a system of rules for their combination. It may be described in terms of phonology (individual sound units), morphology (basic units of meaning including words and inflections), or syntax (the rules for combining the units of meaning). The interaction between form and content involves the potential representation of a content category by a variety of words or syntactic relations between words (Bloom & Lahey, 1978).

Language use refers to the selection of various behaviors based on social and cognitive variables. This selection takes into account the goals of the speaker and the context of the

language event. The particular language form used will depend on what the speaker knows about the listener's background, on the presence or absence of the object, event, or relation referred to, and on whether the message originates with the speaker or is a response by a listener (Bloom & Lahey, 1978).

Language acquisition requires both interdimensional and intradimensional changes. Language content progresses from an understanding of an object's existence to the understanding of complex relations between objects, actions, and events. Language form progresses from simple jabbering, through one- and two-word utterances, to multiword utterances. Language use begins with simple functions such as reference to an object or request for an object and progresses to the encoding of complex messages about abstract ideas. However, language development also involves the integration of these dimensions. The level of integration determines an individual's knowledge of language. In this sense, one's knowledge of language might actually be portrayed as a mental scheme or organization. The more sophisticated the mental scheme, the greater one's knowledge of language (Bloom & Lahey, 1978).

The Bloom and Lahey (1978) three dimensional model of language development is relevant to this investigation because it provides a general theoretical framework for the development of communication skills, a component of language use (Flavell, 1977). The framework suggests that communicative competence is not an isolated ability. It develops in interaction with

linguistic competence (content and form).

The Referential Communication Paradigm

One form of language use is reference. Reference is one of the earliest developing and simplest functions of language. It progresses from simply pointing to or showing an object to describing complex and abstract ideas. Assuming that referential communications are a manifestation of a speaker's communicative competence, many investigators have focused on referential communication skills to assess communicative abilities (Glucksberg, Krauss, & Higgins, 1975).

Referential communication refers to the ability of an individual to formulate a message about an object or event and to transmit that message to a listener who is expected to respond appropriately. In the most common format for this paradigm, a speaker describes an abstract design to a listener. The listener is positioned behind a screen, out of view of the speaker. Both members of this dyad are presented with an identical stimulus array. The speaker is then directed to describe one of the stimuli, the referent, to the listener. The listener receives the speaker's message and must select the referent from the stimulus array (Glucksberg et al., 1975).

A number of authors have proposed models of the referential communication event. Three of these models are very general. Rosenberg and Cohen (1966) proposed a two-stage model of the speaker's activities in formulating the message to be transmitted. In the first stage, the speaker samples his repertoire of

names or descriptors for the referent. Each descriptor may provide a more or less adequate cue for the listener to identify the referent. In the second stage, the speaker compares the descriptor selected to both the referent and nonreferent to determine if it will adequately represent the referent. The speaker must decide whether the descriptor selected has more descriptive strength for the referent than the nonreferent. Determining the critical features that differentiate the referent and nonreferent is an important part of this comparison process.

Glucksberg and Cohen (1968) proposed an addition to the Rosenberg-Cohen model. They suggested that the speaker calls to and holds in a memory buffer all possible descriptors for the referent while evaluating them for their descriptive strength. During this evaluation process the speaker may merely select a descriptor at random and transmit it to a listener or use a more rational approach, such as inspecting the alternatives sequentially and making a decision about the strength of each descriptor. When the speaker feels that the strongest descriptor has been identified, the message is transmitted.

A second general model was suggested by Flavell and his associates (Flavell, Botkin, Fry, Wright, & Jarvis, 1975). They proposed that the speaker begins by formulating a message based on previous knowledge and the current perspective of the referent. The speaker evaluates the message in regard to how

it differentiates the referent from nonreferents and other potential messages. Concurrently, the speaker evaluates the tentative message and alternative messages with assumptions about the listener's background and the information about the referent readily available to the listener. When this analysis is complete, the speaker transmits the message about the referent. This model is more general than the Rosenberg-Cohen model and it emphasizes the analysis of the listener's perspective. In all other respects these two models are synonomous.

Recently, a third general model, which emphasizes the overt aspects of the referential communication event, was proposed by Muma (1975, 1978). Muma (1978) characterized the communication event as a game of "dumping" and "playing." Dumping refers to the speaker's production of a message that best fits the listener and situation. The production is based on: (a) a knowledge of descriptors for the referent, (b) the identification of the features of the referent that differentiate it from the nonreferent, and (c) understanding the listener's need for information. Playing involves the decoding of the message. The listener may decode the message or, when the message is insufficient, decode it with the aid of the speaker.

A number of authors have attempted to more specifically analyze the referential communication event by delineating component skills. Flavell (1977), for example, identified four abilities that can be considered important components of the referential communication event: (a) sensitivity to the features

of the referent that differentiate it from other objects (non-referents) that may be perceived by the listener, (b) sensitivity to the information needed by the listener and the communicative situation, (c) ability to benefit from feedback from the listener concerning the adequacy of the message, and (d) the listener's ability to detect message inadequacies or ambiguities and to request the speaker to clarify the message.

Longhurst (1972) delineated five components of the referential communication event. He proposed that: (a) the speaker must be able to produce a form of language that is intelligible to the listener, (b) the speaker's lexicon must contain words that will differentiate between the attributes of the referent and nonreferents, (c) the speaker must analyze the referent in its field of nonreferents and decide which attributes distinguish it from all existing nonreferents, (d) the speaker must be sure that his message fits the listener's needs by being compatible with his knowledge and capabilities, and (e) the listener must be sensitive to the language form utilized by the speaker and must be able to decode the message.

The most detailed analysis of the referential communication event is that of Glucksberg et al. (1975). They proposed an eight component model. The first five components refer to decisions and actions of the speaker. First, the speaker must determine which of the nonreferents, if any, may be confused with the referent. Second, the speaker must decide, by comparing the referent with potentially confusing nonreferents, which

attributes of the referent are critical to differentiating it from the nonreferents. Third, the speaker must formulate a message that will aid the listener in differentiating the referent from nonreferents. Fourth, the speaker must evaluate the adequacy of the message before it is transmitted to the listener. This evaluation is based on what the speaker believes to be the information needed by the listener. Fifth, when the speaker decides that the message is adequate, the message must be transmitted to the listener.

The three remaining components refer to decisions and actions of the listener and a possible clarification by the speaker. The sixth component is that the listener must decide whether there is enough information to perform the response required by the message or if clarification of the message is needed. The seventh component is that the listener must assume the role of speaker by providing feedback that a response to the message is not possible, if the message was not adequate. The eighth component is that the original speaker, based on feedback from the original listener, either modifies the original message or provides the listener with a new message.

There are a number of similarities between the component analyses by Flavell (1977), Longhurst (1972), and Glucksberg et al. (1975). They each proposed the necessity for the speaker to analyze the referent in contrast to nonreferents. They suggested that the speaker must understand the informational needs of the listener and adapt the message accordingly. In essence,

the speaker must consider the perspective and capabilities of the listener. They also assumed that the speaker will transmit the message using common language structures so the message will be understood by the listener and alter his/her behavior appropriately. Finally, they proposed that the listener must be able to decode the speaker's message.

Although these attempts to delineate the components of the referential communication event share common elements, the analysis by Glucksberg et al. (1975) is the most comprehensive. Therefore, it will be used as the framework to discuss the research activities within the referential communication paradigm.

Referential Communication Research with Nonretarded Individuals

Investigators using the referential communication paradigm have attempted to assess the effects of one or more of the components identified by Glucksberg et al. (1975). However, understanding the referential communication process and the components involved in that process requires inferences across studies. Therefore, this section will be devoted to a review of the majority of the research endeavors related to the role of the speaker, using the components delineated by Glucksberg et al. (1975) as an organizational scheme.

Two approaches have been used to study referential communication, each focusing on one or more of the components of the referential communication event. One approach has been to experimentally isolate the components of the referential communication

by manipulating task variables (direct investigation). The second approach, which is somewhat more indirect, has been to train the participants on components that are presumed to be a part of the referential communication event. If specific component training improves a child's communicative effectiveness, an inference can be made that the skill trained was necessary for accurate communication, assuming the child initially lacked that skill (Asher & Wigfield, 1981). Both of these approaches will be addressed in the following review, where appropriate.

The Referent

A number of investigators have been concerned with the effects of characteristics of the referent on referential communication. Krauss and Weinheimer (1967), for example, hypothesized that the codability of a referent depends, in part, on its similarity to the nonreferent. They asked 30 adults to describe color chips that were embedded in either a similar or a dissimilar set of chips. The participant's descriptions were elicited in a monologue or a dialogue condition. In the monologue condition, participants were asked to formulate a message about the set and tape record it so that an individual could listen to the message at a future time and accurately place the color chips, referred to in the message, in their original order. In the dialogue condition, pairs of participants, who were visually separated, were given identical sets of color chips that varied in sequence of presentation. Their task was to describe and match the color sequence. Participants in both conditions

were presented with six similar and six dissimilar sets of color chips. No time limits were set in either condition. There were no restrictions on the content of the interaction in the dialogue condition.

Referents had greater codability when they were members of dissimilar sets than when they were members of similar sets. However, a significant referent set by condition interaction was reported, suggesting that an individual's ability to formulate a message about a referent set, whether similar or dissimilar, may be related to feedback provided by the listener. Therefore, although this investigation suggested that codability was related to the uniqueness of the referent, a clear conclusion could not be offered. However, it can be suggested that the referential communication event does not occur as a sequence of discrete components, but involves several components (i.e., comparing the referent to possible nonreferents, transmitting the message to a listener, and receiving feedback regarding the accuracy of the message).

Longhurst and Turnure (1971) were also interested in how the characteristics of the referent affected communicative effectiveness within the referential communication paradigm. They asked two groups of preschoolers, aged 2½ to 3½ years and 4 to 5 years, to perform a match-to-sample task using stimuli commonly employed in previous referential communication research (Krauss & Glucksberg, 1969). The children were shown an abstract drawing for 5 seconds and then asked to find a similar drawing from

a set of six abstract drawings. While performance of the older children was significantly better than that of the younger children, only 3 of 28 children performed the task without errors.

Longhurst and Turnure (1971) concluded that the nature of the stimuli (i.e., abstract or concrete) and the visual discrimination skills of the children affected communicative effectiveness. They suggested that these possible confounding variables be controlled by training the children to reliably discriminate the stimuli to be used in the communication task.

Dickson (1979) reported findings that supported the conclusions of Longhurst and Turnure (1971). Using a standard referential communication task, he varied the type of referent presented. The referents ranged in difficulty from nameable pictures to abstract figures. Children as young as 4½ years old communicated effectively when pictures of common objects, people, and animals were used as referents. However, they performed poorly when abstract designs were used.

In general, studies on the effects of the characteristics of the referent indicated that it is more difficult to formulate messages when the nonreferents are similar to the referent and when the referent is not easily labeled or unfamiliar to the speaker. This would imply that in the study of young children or the mentally retarded, caution should be exercised in selecting a referent set. If referent complexity is not controlled, communicative competence may be confused with one's ability to identify or label an object.

Comparison Skills

Direct investigations. A number of investigators have postulated that in formulating an effective message, a speaker must compare the referent to possible nonreferents in order to decide which attributes of the referent are critical in differentiating it from nonreferents (Glucksberg et al., 1975). Whitehurst and Merkur (1977) hypothesized that a child's inability or failure to compare the referent and nonreferent was the source of poor communicative performance. They tested 12 boys and 12 girls from each of three grades: kindergarten, second, and fourth. The children participated in a two person communication game. The game involved describing a triangle from a set of two or three triangles that were constructed by combining three attributes: color, size, and pattern.

The younger children most often produced uninformative messages. Whitehurst and Merkur (1977) concluded that this was the result of their failure to compare the referent and nonreferent and their failure to determine the critical differences between the referent and nonreferent. They further concluded that children through the age of 6 or 7 were unable to compare two or more stimuli and isolate attributes unique to one of the stimuli.

Whitehurst and Sonnenschein (1978) were dissatisfied with the conclusion that young children were unable to compare the referent to nonreferents. They hypothesized that young children might be capable of comparing and contrasting the referent

with nonreferents if discriminations involved only a single attribute that remained constant over trials. To test this hypothesis they used the two-person communication game with a group of 5-year-olds.

They required the children to describe one of a pair of triangles. As in the previous study, the triangles differed in color, size, and pattern. Following a vocabulary pretest, the children were randomly assigned to either a simple or complex condition. In the simple condition, the pairs of triangles could always be distinguished on the basis of the same attribute. In the complex condition, the attribute or attributes that differentiated the triangles in a given pair were varied from trial to trial.

Almost all of the messages formulated by the children in the simple condition were informative. Assuming that the simple condition required a comparison of the relevant attribute of the referent to the nonreferent, it can be concluded, contrary to previous findings (Whitehurst & Merkur, 1977), that young children are indeed capable of making these types of comparisons. Whitehurst and Sonnenschein suggested that young children have difficulty discriminating two or more relevant attributes. Therefore, it can be concluded that a child's ability to referentially communicate is affected by the ability to make all the relevant comparisons to differentiate the referent from the nonreferent in a way that allows the formulation of a clear message.

Component training studies. Several investigators have

improved the communicative effectiveness of young children by training them to compare the referent to nonreferents. Fry (1966) attempted to train 12-year-olds to be more effective communicators. A referential communication task was used in which a speaker described one of a set of designs to a listener. Training involved the listener confronting the speaker with the inadequacy of the message and how it might be improved. An analysis of Fry's procedures indicated that the students were actually taught to compare the referent to nonreferents and to formulate adequate messages. Following training, communication efficiency improved on tasks similar to the training task. These communication improvements did not transfer to related tasks that required the speaker to provide a written description of an abstract design and to explain the rules of a new game to a listener.

Asher and Wigfield (1981) used modeling, practice, and feedback concerning the adequacy of the message to train third- and fourth-grade children to formulate messages that included the features of the referent that differentiated it from the nonreferent. Children taught to engage in comparison activities described the referent in a word-pair task more accurately than a group of children who had only been required to practice that task. Consequently, the children taught to compare the referent and nonreferent were more effective communicators. These gains were maintained after a one month interval.

Although Asher and Wigfield (1981) achieved the predicted outcome, the performance of the comparison training group

remained relatively poor. These children averaged only 5 out of 10 possible correct communications. They hypothesized that children may not be able to differentiate good from poor clues. However, they found that children exposed to comparison training displayed significantly greater message appraisal accuracy than children who just practiced the word-pair referential communication task.

If the children did not have difficulty determining a good from a poor message, what might have contributed to their relatively poor communicative performance? Asher and Wigfield (1981) hypothesized that the difficulty might lie in their lack of "clue-thinking" strategies or in their limited knowledge of the referent and nonreferent. They again asked children to formulate a message about a referent in a word-pair task. The children, who had received comparison training prior to this investigation, were randomly assigned to either a comparison reminder group or a comparison reminder and strategy training group. Children in the comparison reminder and strategy training group were taught to think of either words associated with the referent or examples of the referent. Children in the comparison reminder group were only instructed to compare the referent and nonreferent. The performance of girls who had received strategy training improved significantly. However, boys receiving strategy training were no more effective as communicators than they had been following the initial comparison training. Therefore, only partial confirmation of the clue-thinking hypothesis was

attained. Asher and Wigfield (1981) concluded that, although comparison training was an important factor in improving communicative competence, other factors such as limited knowledge of the referent and nonreferent or lack of effective clue-thinking strategies may effect communication performance.

Comparison training was also an important factor in a series of studies conducted by Whitehurst and Sonnenschein (1981). They trained children to engage in comparison activities. The training task was one previously designed to investigate children's comparison skills (Whitehurst & Sonnenschein, 1978). The task involved the description of one of a pair of triangles. Sixty-four 5-year-olds were randomly assigned to four training groups. Children in the communication instruction/uninformative feedback group were given the instruction to describe a triangle with a star above it so the experimenter would know which triangle was being described. They received noncommital feedback, such as a head nod, after each training trial. The communication instruction/perceptual feedback group received the same communication instruction but was given explicit feedback concerning the accuracy of their message and why it was correct or incorrect. The remaining groups were provided an additional communication instruction to tell how the referent triangle differed from the nonreferent triangle. This was paired with either the uninformative feedback or the perceptual feedback. The children were not permitted to reformulate their initial messages.

Children who received some type of instruction to formulate

a message about the referent paired with perceptual feedback about their performance produced the most informative messages. The communication instruction/perceptual feedback group generalized the skills they had learned to a task similar to the training task in which the triangles were replaced by common objects but not to a task in which the number of comparisons needed for successful communication was increased. Whitehurst and Sonnenschein (1981) suggested that the child's failure to compare features of the referent and nonreferent would result in an uninformative message. This conclusion was similar to that of Asher and Wigfield (1981).

Studies investigating the comparison skills of children have suggested that a failure to determine the critical features of the referent in contrast to nonreferents will lead to the formulation of ineffective messages. It has been shown that even young children do make comparisons, depending on the task demands. However, the conditions under which a child is able to determine the critical features of a referent and the development of this ability have not been adequately described.

Role-taking

Direct investigations. More research has been done on the sensitivity of the speaker to the listener's point of view than on any other component of the referential communication event. This area of investigation originated with Piaget (1926), who found that young children communicated poorly and concluded that this was a result of their failure to consider the listener's

needs. He attributed this failure to the egocentric nature of the child's thoughts. In essence, he contended that children fail to consider the point of view of the listener because they are not aware that another person's perspective may differ from their own.

Flavell et al. (1975) conducted a series of studies to provide support for the Piagetian hypothesis. They characterized the sensitivity of the speaker to the needs of the listener as role-taking abilities. In the role-taking process the speaker acknowledges that other persons' perspectives exist and realizes that understanding another's perspective is useful. The speaker then analyzes the perspective of the listener and uses this knowledge to formulate a message which the listener will comprehend.

Flavell et al. (1975) reported that both role-taking and communication abilities improved with age, with children younger than 9 or 10 unable to adapt their communications to the perspective of the listener. They contended that their findings supported the Piagetian hypothesis that cognitive egocentrism was a major determinant of the inadequacy of young children's messages. Flavell et al. concluded that the children's messages were inadequate because the children lacked role-taking abilities. This deficiency was attributed to the children's egocentric thinking.

Based on this analysis, it seems reasonable to predict a significant positive relationship between role-taking ability

and communicative effectiveness. However, other than the studies of Flavell et al. (1975), the empirical support for this prediction is sparse (Glucksberg et al., 1975). The studies that have investigated this relationship have been relatively few and of these, only a small number have reported a significant positive correlation.

A recent study, representative of the investigation of the relationship between role-taking ability and communicative effectiveness, was conducted by Shantz and Steinlauf (Note 1). They administered a battery of tests to 80 children from grades one through four. Referential communication was measured using a checkerboard task in which the speaker placed a toy animal, from a set of six, on one of six squares on the checkerboard. The speaker was then instructed to inform the listener, who had identical materials and was seated behind a screen, which animal was selected and to indicate where it had been placed. Communication adequacy was measured by summing the critical attributes, which distinguished the animal location, for each speaker for the first four trials. Role-taking was assessed using a modification of a task used by Piaget. The children were presented with a gas station scene. They were asked to identify the picture that correctly depicted the location of the station, pumps, and sign from another's location. The degree of role-taking the children had developed was measured using a weighted scoring system. The children

received three points for a correct choice and no points for a response in which they attributed their view to another. Intermediate scores were assigned for varying degrees of accuracy. A second role-taking task was also used. In this task the children were asked to tell a story about a set of pictures of a boy who appeared to have climbed a tree to escape a dog. This set was then replaced by one in which the dog was absent. The children were asked to tell a story that might be told by someone who had only seen the second set of pictures. The degree to which each child included the fear-of-dog motive to explain the boy's behavior when telling the story about the second set of pictures was used as a measure of eogcentrism.

Correlational analyses of the results of these tasks indicated that role-taking was not highly related to communicative performance. These results are very similar to other studies that reported only limited relationships between role-taking ability and communicative performance (Looft, 1972; Steinlauf, 1974). Even when significant correlational outcomes have been reported, they seldom account for more than 25% of the variance in communicative performance (Shantz, 1981).

Why do some investigators find a significant positive relationship between role-taking abilities and communicative competence while others do not? Shantz (1981) contended that when significant positive correlations have been reported, they were most often due to the measurement of both variables from the

same data base, the speaker's message. Egocentric messages provide little information about a referent, resulting in a poor communication. Thus a relationship between the two variables is then assumed. However, when the two variables have been compared using independent tasks (e.g., Shantz & Steinlauf, Note 1) a significant positive correlation has seldom been found.

Shantz (1981) further suggested that even when role-taking and communicative competence have been assessed independently, the tasks used require a significant degree of linguistic competence. Therefore, the correlation between the two variables may be a measure of the verbal demands of the tasks and not an indication of the relationship between the two variables.

Shantz (1981) concluded that, although role-taking ability may play some part in the formulation of a referential communication, egocentrism and role-taking deficits were not an adequate explanation of referential communication failures. She concluded that communicative performance was dependent on several factors including: (a) the ability to perceive critical attributes of the referent and nonreferent, (b) the ability to compare these attributes, and (c) the ability to encode the critical differences in a message.

Component training studies. The earliest attempts to train referential communication skills made the assumption that poor communicators were deficient in role-taking abilities. Role-reversal and confrontation were used to improve children's

communications. The role-reversal hypothesis suggested that a child who experiences both the perspective of the speaker and the listener will be better able to formulate adequate messages. This experience will help the speaker understand the perspective of the listener. The confrontation hypothesis proposed that confronting the speaker with the realization that the message was inadequate would attenuate the speaker's belief that the initial message was perfectly clear. Several studies have used these techniques (Shantz, 1981).

Shantz and Wilson (1972) used both role-reversal and confrontation to train second graders to be more effective communicators. Twenty-four 7-year-olds were randomly assigned to one of two groups, a training group or a control group. The training group was then involved in two slightly different communication tasks. One task required the speaker to describe a geometric design so that the listener could draw the design. The second task only required the speaker to help the listener to identify the referent design from a set of four designs. The children in the training group performed these tasks in groups of three, including a speaker, a listener, and a listener-observer. Each child participated an equivalent amount of time in each role. During training, feedback about the message accuracy was provided by the experimenter and two listeners.

Children in the training group were significantly more accurate in performing each task than the untrained control group. However, the more accurate performance of the training

group on the drawing task must be qualified by a significant improvement in the performance of the control group on this task from pretest to posttest. Three generalization tasks were also administered following the posttests. Two of these tasks were similar to the training task: a checkerboard task involving placement of six toys on six squares and a block stacking task involving sequential arrangement of a series of abstract designs. The third was a generalization task. The children were asked to sell a tie to a prospective buyer (a persuasion task).

Shantz and Wilson reported a moderate amount of transfer of training. However, the accuracy of this interpretation was questionable. Although statistical significance was achieved on the checkerboard task ($p<.05$), the mean number of critical attributes mentioned on six placements (the dependent measure) by the training group was 21.1, while the untrained group mentioned 18.9 critical attributes. The untrained group mentioned nearly as many critical attributes as the trained group. The performance of the untrained group makes suspect the conclusion that the more accurate performance of the trained group was due to the training.

Performance on the block stacking task was also difficult to interpret. Initially, the control group performed much better than the trained group. However, after several trials, the training group's performance improved significantly more than that of the the control group. Finally, the control group's

performance on the persuasion task was significantly more effective than that of the trained group. These results do not provide convincing evidence that transfer of training occurred.

Chandler, Greenspan, and Barenboim (1974) also used the confrontation method to train emotionally disturbed adolescents to be more effective communicators. They presented each student with interesting tasks that were within and slightly above his/her ability level. The communication tasks were a series of games that varied in complexity. Simple table games included dyadic use of blocks, coloring books, etc. More elaborate games included variations of blindman's bluff and a walkie-talkie treasure hunt. The students demonstrated gains in communication effectiveness.

Role-taking training has been an effective method of improving communicative competence. However, this form of referential communication training does not provide information that might be useful in determining exactly what factors of training were responsible for the improvements in communication effectiveness (Asher & Wigfield, 1981).

Egocentric Messages

Several investigators have attempted to directly assess the validity of the egocentrism explanation of communication failure. For example, Asher and Oden (1976) were interested in determining whether the young child's communications were truly egocentric. They used a word-pair referential communication task in which the speaker was presented with a pair of words and

asked to describe one of the words to a listener. Third and fifth graders were randomly assigned to one of two groups. Half of the children in each group were poor communicators and half were good communicators. Both groups were then asked to identify the referent word in each pair. During this test condition, half the word pairs were presented with the child's clue words and the remainder were presented with no clue. To control for the effects of memory on performance, one group was tested immediately and the other after a two week delay.

There was no difference in performance based on the presence or absence of a clue in the immediate condition for either good or poor communicators. In the delayed condition, the self-generated clues proved to be of little benefit to poor communicators. The egocentrism hypothesis would have predicted that poor communicators would benefit from their egocentric messages.

A recent study by Dickson (1979) also provided evidence refuting the egocentrism hypothesis. Dickson used a referential communication task in which he varied the context of the referent array and permitted feedback to the speaker by the listener. Two context conditions were included. In one, only the referent was presented to the speaker. In the second, the referent was included among three nonreferents. The listener was always presented with an array that included the referent and three nonreferents. Children as young as 4 years old communicated more effectively when the referent set had highly familiar and salient attributes (e.g., pictures of people that differed in

color and form). However, 8-year-olds were ineffective in using the context to encode messages about referents when the referent dimensions were less salient and systematic (e.g., abstract designs). Dickson concluded that the ability of 4-year-olds to use the context in encoding their messages was contrary to the egocentrism hypothesis. Children's ability to communicate appeared to be more related to the demands of the communication task than their ability to consider the perspective of the listener.

Maratsos (1973) conducted a study in which 3- and 5-year-olds were required to communicate their choice of a toy to a person who could see or to someone with her eyes covered. The referential communication task was embedded in a game played by the experimenter and the child. The children's communications to the experimenter with her eyes closed and covered were much more elaborate than when the experimenter's eyes were open and not covered. These children did account for the perspective of the listener in formulating their messages.

Neither role-taking deficiencies nor egocentrism adequately explain communicative failure, since empirical support has been limited and correlational in nature. In addition, young children who might be considered poor communicators have utilized role-taking skills and produced messages that were not egocentic when the tasks were within the ability level of the children and they understood what was expected of them (Dickson, 1979; Maratsos, 1973).

The Message

Direct investigations. Another component of referential communication is the transmission of the message by the speaker. Several investigators have found that young speakers have difficulty assessing the adequacy of a message. Asher (1976) provided second, fourth, and sixth graders with a message that identified the referent in a word pair. Half of the messages were adequate and half were inadequate. The children were asked to assess the value of each message in differentiating the referent from the nonreferent. Second graders had much more difficulty judging the effectiveness of a message than either fourth or sixth graders. Asher attributed the second graders' difficulty to their inability to compare the referent to the nonreferent in order to determine the critical features that differentiated them.

Bearison and Levey (1977) were suspicious of Asher's procedures. They suggested that asking children to assess the messages of an imaginary speaker eliminated the features that commonly define communicative situations. They designed a task that was more natural. Each message was in the form of a question. The children, kindergarten, second, and fourth graders, were asked to tell the experimenter whether each question was good or bad. Despite these changes, Bearison and Levey obtained results similar to those of Asher (1976).

Component training studies. Two attempts to train referential communication skills to young children were also notable

for the use of message modeling to improve communication effectiveness. Sonnenschein and Whitehurst (1980) found that first graders produced more informative messages when accurate messages were modeled for them by adults and peers. A similar finding was reported by Lefebvre-Pinard and Reid (1980). They trained first-grade students to be more effective communicators by having them observe the effective communications of peers. Although it was not possible from these investigations to determine what components of the modeled communications were responsible for the improved communicative performance, the results indicate that young children can be trained to formulate more effective messages.

Conclusions About the Components

Taken together, these investigations suggest that effective referential communication requires the integration of two or more of the skills proposed by Glucksberg et al. (1975). Of these, the most critical component for the speaker appears to be the ability to compare the referent to nonreferents (Asher & Wigfield, 1981; Whitehurst & Sonnenschein, 1981). However, the ability to transmit an acceptable message to a listener has also been an area of concern (Asher, 1976; Bearison & Levey, 1977) especially with the mentally retarded population (Grossman, 1977). This concern will be discussed in more detail in a later section.

Naturalistic Observations

A second approach to investigating communicative competence considers language use in a much broader context than the referential communication paradigm. The sociolinguistic approach

uses systematic observations of children's communications in natural or real life settings to study communicative competence (Flavell, 1977). Wellman and Lempers (1977), for example, videotaped 2-year-olds involved in preschool and playgroup activities. They analyzed these tapes and recorded instances of referential communication. These children engaged in a range of language behaviors from pointing to the use of two- and three-word requests.

According to Flavell (1977), the referential communication and sociolinguistic paradigms differ in at least three ways. First, the study of the acquisition of communication skills in the sociolinguistic approach includes more than the development of referential communication skills. It includes many other communicative acts and functions (e.g., using language for commands, comments, simple requests, denials, etc.). Second, the referential communication approach uses controlled interactions to collect data, whereas the sociolinguistic approach systematically observes children in natural settings. Finally, the two approaches yield different results. For example, investigators using the referential communication approach have frequently found children younger than 9 or 10 to be poor communicators. With the sociolinguistic approach, however, investigators have found that children as young as 2 years old can be effective communicators.

The discrepant results regarding the age at which an individual displays referential communication skills have, in

part, been related to differences in the context of the communication situations and the task demands. More specifically, pointing and gesturing could be used to transmit a message in the naturalistic studies when the object names were not known. Pointing and gesturing were not possible in the referential communication studies. In addition, the abstract drawings used in the referential communcation studies were designed to be difficult to identify (Krauss, 1979). The speakers in the natural settings were most often describing items that were highly familiar. Therefore, identification and/or the inability to label an object may have been confounding factors in the laboratory studies. The communicative abilities of those involved in the laboratory studies may have been underestimated due to the demands of deciding what to name each stimulus (Longhurst & Turnure, 1971). To develop an understanding of the factors that influence the communication difficulties of the mentally retarded, the contribution of these factors must be understood.

Language Development and Mental Retardation

The study of language development in the mentally retarded has focused primarily on the language dimensions of content and form (Lackner, 1968; Lenneberg, Nichols, & Rosenberg, 1964; Ryan, 1975). The vast majority of these studies have compared the development of various language behaviors in the mentally retarded with the nonretarded (Ryan, 1975). Conclusions regarding the similarity of language development in mentally retarded and

nonretarded children have been mixed.

Lackner (1968) proposed that mental retardation did not result in different language behaviors but a delay in the normal developmental sequence which plateaued below the level achieved by normally developing children. He selected five mentally retarded children with mental ages ranging from 2 to 9 years. Both spontaneous and elicited utterances were recorded for each child over an eight week period. One thousand sentences were then randomly selected from each child's language sample. These sentences were analyzed for sentence length and sentence type, and rules of grammar were written for each child.

Lackner used the grammars generated for the children to devise imitation and comprehension tasks. He administered these tasks to the five mentally retarded children to assess their language comprehension. The tasks were also administered to a group of nonretarded children to establish the linguistic levels of the retarded children.

The complexity of the children's grammars increased with their increasing mental ages. These developmental changes were consistent with and similar to the linguistic developmental changes in the nonretarded children. However, the language acquisition rate appeared much slower and terminated before adult linguistic levels were achieved.

Several issues must be considered in interpreting Lackner's results and conclusions. First, he assessed only one dimension of language acquisition, the development of language form. His

analysis was limited to the children's utterance length and their knowledge of syntactic rules. He made no comparisons regarding content categories or use of language. Therefore, conclusions can only be offered with regard to one dimension of language development. In addition, Lackner's mentally retarded children were etiologically and behaviorally homogeneous. Four of the children had suffered significant brain trauma at birth or shortly thereafter. The fifth child, who had the highest mental age (8 years, 10 months), acquired significant brain damage at about 3 years of age. All of the children were physically handicapped. Generalizing the results of this investigation to the etiologically and behaviorally heterogeneous population of mentally retarded children should be approached with caution. Various genetic, metabolic, and environmental conditions may interact with the development of the language dimensions of form, content, and use, resulting in atypical language development. For example, a 3 year old mentally retarded child, with a mental age of 2 years, known to the present investigator, had developed and utilized a very sophisticated gestural communication system. This child's understanding of the use and meaning of language were much more developed than his knowledge of syntactic rules. This situation was not typical of normal developmental trends in language acquisition as defined by Lackner.

Finally, Lackner's cross-sectional design only permits an analysis of the children's level of language develop-

ment and does not provide an understanding of the process by which the children reached these levels of development. Because of the high positive correlation between language ability and mental age (Sattler, 1982), it was not unreasonable to expect the language abilities of the children to improve with increasing mental age. However, this does not address the process of language acquisition, especially the interaction of the development of language form, content, and use with factors such as environment and biological makeup.

Ryan (1975), dissatisfied with the mental age comparison used by Lackner (1968), matched retarded and nonretarded children according to mean length of utterance. She compared the language of 16 Down Syndrome children, 15 mentally retarded children with varying etiologies, and 13 nonretarded children. The retarded children ranged in age from 5 to 9 years with mental ages between 2½ and 3½ years. The nonretarded children ranged in age from 2 to 3½ years. She analyzed both their spontaneous speech and speech elicited by a variety of tests. The nonretarded children produced syntactically more complex language and made fewer syntactic errors than the retarded children. However, the retarded children were able to identify and label more objects than the nonretarded children. There was also a greater degree of variability in the language abilities of the retarded children, regardless of etiology, compared to the nonretarded children. These results were not consistent with the contention that retarded children show the same trends in language acquisi-

tion as nonretarded children.

Several other investigators have compared the language abilities of the mentally retarded with those of nonretarded children matched either on mental age or mean length of utterance (Graham & Graham, 1971; Lenneberg et al., 1964; Mein, 1961). The majority of these investigations have concluded that there were no differences in the development of language content and form in retarded and nonretarded children (Ryan, 1975). However, the degree of variability in language development has been shown to be much greater for the mentally retarded (Ryan, 1975). It can also be concluded that mentally retarded children are more likely to have language deficits than nonretarded children of the same chronological age (Keane, 1972).

Communication and Mental Retardation

The dimension of language use has not been studied as intensely as the dimensions of content and form. The few studies that have addressed this dimension of language development have been concerned with comparing the communicative competence of the mentally retarded to the nonretarded (Longhurst, 1974), identifying task procedures which affect communication accuracy (Rueda & Chan, 1980), and describing the communicative behavior used by mentally retarded children (Berry & Marshall, 1978; Price-Williams & Sabsay, 1979). The particular components of the communication event that contribute to this deficit have not been extensively investigated. Nevertheless, research has provided some information concerning the nature of the deficits.

Hollis (1966) investigated the ability of moderately and severely retarded children and adolescents to transmit a simple message. He used a Wisconsin General Test Apparatus modified to test dyads. One participant was to communicate which one of four compartments contained a food reward. The reward was delivered contingent upon a correct communication. The participants communicated accurately only about 60% of the time, primarily using gestures. The speakers seemed to be limited in their ability to send accurate information and did not become more proficient with practice even though they were given over 1600 trials. Using the same apparatus and similar procedures Spradlin, Girardeau, and Corte (1967, 1969) and Evans (1965) reported similar results.

Longhurst (1974) investigated the referential communication skills of retarded adolescents at three different intelligence levels (IQs: 70-90; 59-69; 40-55). A referential communication task was used in which a speaker described an abstract design to a listener positioned out of view behind a screen. Adolescents in the higher intelligence group produced more accurate messages than those in the lower intelligence group, but all groups produced a significant number of ineffective messages. It should also be noted that the lower intelligence group formulated effective messages only about 50% of the time. This group, in contrast to the others, was composed of only 30% of the original sample from that intelligence level. The remaining 70% were unable to complete the pretest and pretraining and were excluded.

In a subsequent study using the same apparatus and similar procedures, Longhurst and Berry (1975) found that mentally retarded speakers benefited most from explicit feedback from the listener regarding the clarity of their message. When told explicitly to rephrase their message, many of the speakers attempted to redescribe the referent. Explicit feedback was much more effective in alerting the speaker that the message needed clarification than either gestural feedback (a puzzled look) or implicit feedback ("I don't understand.").

Rueda and Chan (1980) contended that the poor communicative performance of the moderately mentally retarded individuals in the Longhurst studies was in part due to their inability to identify and/or label the abstract designs. They devised a task that involved a two-choice discrimination of pictures of common objects. Moderately retarded adolescents communicated effectively when the referent and nonreferent were from different categories (e.g., a hat and a car). However, when the objects were from the same category but differed along some dimension (size, color, or shape), the students had difficulty formulating an effective message. This suggested a deficit in their ability to compare the referent and nonreferent to determine the critical differences. It should also be noted that, although the students in the different category condition were more successful in performing this task than those who performed the task used by Longhurst, there were still a substantial number of ineffective communications.

Since these and other similar studies had been conducted in relatively narrow laboratory situations, Bray, Biasini, and Thrasher (in press) devised a referential communication task that was more naturalistic and could be used to assess the communication skills of both moderately and severely retarded individuals. The unique features of this task included: (a) stimulus objects that were highly familiar to the participants, (b) a more naturalistic format (in lieu of the standard laboratory tasks), and (c) pointing and gesturing as acceptable forms of communication, since they have been identified as the earliest forms of communicative behavior to emerge (Murphy, 1978).

Bray et al. (in press) used a store game task in which the speaker (customer) faced the listener (storekeeper). The customer was required to obtain a familiar object from the storekeeper who was seated behind a plexiglass storecounter. Contrary to previous findings (Longhurst, 1974; Rueda & Chan, 1980), moderately retarded individuals communicated with perfect accuracy and the communicative effectiveness of the severely retarded improved with practice. However, all of these individuals participated in a pretraining task that required them to compare the referent to a nonreferent. This comparison training may have improved their communication performance in the store game.

The ability of mentally retarded children to compare the referent to nonreferents was assessed by Watson (1978). She had mildly retarded and nonretarded children perform a series

of referential communication tasks involving description of objects and actions. The mentally retarded children, by failing to compare the referent to the nonreferent, failed to determine the critical features of the referent. However, when permitted to manipulate the referent and nonreferent objects, the mentally retarded children provided significantly improved descriptions. This manipulation procedure may have provided the speakers with additional knowledge about the referent which aided in differentiating it from the nonreferent.

Two naturalistic studies were concerned with identifying the communicative behaviors used by severely mentally retarded individuals. Berry and Marshall (1978) recorded the interactions of four mentally retarded preschool children. The children used gestures, utterances, and words to refer to objects available to them. It was also noted that their communicative behaviors increased in the presence of an adult teacher, suggesting that environmental manipulation can increase communicative output. However, their communications were frequently not comprehensible. Price-Williams and Sabsay (1979) recorded the interactions of nine severely retarded instituitionalized adults, all of whom were diagnosed as having Down Syndrome. These individuals used gestures, utterances, and words to refer to objects and make requests.

It appears that some mentally retarded individuals can successfully perform and integrate the components of the communication event and provide an effective communication. Many,

however, have difficulty formulating and transmitting an effective message and comparing the referent to nonreferents. Based on the descriptive, developmental data provided by studies with nonretarded children, these two skills appear to be critical to producing an effective message. Therefore, it seems reasonable to suggest that mentally retarded individuals might benefit from the training of these components of the communication event.

Communication Training with the Severely Retarded

The referential communication paradigm provides an excellent format for training individuals with deficits in communicative competence (Longhurst & Reichle, 1975; Muma, 1978). As noted earlier, training various components of the communication event can also be used to test hypotheses concerning the nature of the deficits responsible for communication failure. Investigators training mentally retarded individuals to be more effective communicators have not been concerned with this type of hypothesis testing. The few training studies that have been conducted with the severely mentally retarded have been primarily concerned with developing training techniques. Nevertheless, the training of communication deficient children has not been extensively investigated, especially in the context of the referential communication paradigm.

Halle, Marshall, and Spradlin (1979) attempted to increase the communications of six severely and profoundly retarded children who had been institutionalized for several years. They used

a modification of the incidental teaching technique employed by Hart and Risley (1968). Incidental teaching involves placing frequently used toys and activities out of reach of children during class freetime while presenting subtle cues to communicate.

Halle et al. (1979) were interested in increasing the children's spontaneous requests for their trays at mealtime. Initially, they used a 15-second delay during which time the tray was in view but out of reach of the children. If a child did not respond following the delay, a request was modeled by a staff member ("Tray please."). The modeling prompt was presented a maximum of three times. Three of the children participated in this part of the training. The other children only observed the procedures used with their peers (peer modeling). Only one of the children in the training group spontaneously requested a tray following the 15-second delay. The other two children began to request their trays following the introduction of the modeling prompt. For the remaining three children, who had observed the peer models, the 15-second delay was sufficient to increase their spontaneous request for their trays. The children also made tray requests at untrained meals and in the presence of strangers.

Although these techniques were effective in increasing the spontaneous requests of the children, several issues were not addressed. First, it was not clear what aspect of the procedure was responsible for the initial communication failure. Second,

only one communication mode was used in training, oral communication. No attempt was made to use gestures as an effective means of communicating. Although it was true that the spontaneous communications of the children increased, it was doubtful that the children learned communication behaviors that were useful in other settings. Encouraging the use of both gestures and verbalizations might have provided the children communication behaviors that were transsituational. The use of gestures would not have been situation specific and would have provided an observable and readily shapable response.

In a similar investigation Halle, Baer, and Spradlin (1981) increased the spontaneous communications of six moderately retarded, language delayed children. They required teachers to use a 5-second delay in a variety of naturally occurring situations that provided the opportunity for the use of such a delay (e.g., mealtime, snack time, gross motor activities). Consistently used delays increased the spontaneous communications of the children. Once again, however, the focus was on the delay technique, not on the factors responsible for the initial communication failure.

Some of the techniques used to train the components of the referential communication event to nonretarded, nonlanguage delayed children have also been shown to be effective with retarded individuals in other tasks. For example, Whitman, Burish, and Collins (1972) increased the interpersonal language behaviors of two moderately retarded children by using verbal

instructions, feedback, and reinforcement (praise and tokens). Three simple games were used. Interpersonal language behaviors, in which direct eye contact was established or in which one child formally acquired another child's attention, increased both during the training sessions and a nontraining rating session.

Other studies with severely mentally retarded individuals have successfully trained a variety of language behaviors using modeling or imitation training coupled with feedback from the experimenter (Whitman & Scibak, 1979). For instance, Guess, Sailor, Rutherford, and Baer (1968) trained a severely retarded girl to use plural morphemes by reinforcing correct imitations of the experimenter's singular and plural verbalizations when corresponding object sets were placed before her. Twardosz and Baer (1973) used imitations of the experimenter and differential reinforcement to train two severely retarded indivduals to ask questions about various items presented to them. Bricker and Bricker (1972) found modeling and shaping to be effective techniques in teaching a sign vocabulary to severely retarded children. These studies suggest that these techniques might be used to train severely mentally retarded individuals to be more effective communicators within the context of the referential communication paradigm. However, as noted earlier, this issue has not been adequately investigated.

Statement of the Problem

Glucksberg et al. (1975) identified five component skills that a referential communicator may use in formulating a message. Two approaches have been used to study these component skills in nonretarded individuals. One approach directly varies individual components. The other approach trains component skills and assumes that improvements in communicative effectiveness indicate deficits in these skills areas prior to training. These studies have indicated several critical factors involved in formulating an effective message. Two of these factors relate to the nature of the referent. Familiarity with the referent affects an individual's ability to formulate a message about that referent (Dickson, 1979). In addition, the more similar a referent is to potential nonreferents, the more difficult it is to formulate an effective message (Rueda & Chan, 1980). The most critical component for the speaker, however, appears to be the ability to compare the referent to nonreferents (Asher & Wigfield, 1981). Finally, the ability to transmit an acceptable message has also been an area of concern (Asher, 1976).

Communication research with the mentally retarded has indicated that the severely mentally retarded are poor communicators relative to moderately and mildly retarded and nonretarded individuals. While young children have also been found to be poor comunicators in referential communication tasks, training them to perform critical components of the communication event has improved their communication effectiveness. The purpose of the

present investigation is to train severely mentally retarded children to be more effective communicators within the context of the referential communication paradigm and assess the importance of three component skills involved in formulating an effective message: coping with referent similarity to the nonreferent, comparison skills, and ability to transmit a message.

A number of training procedures will be used in the context of the referential communication paradigm. These include: (a) using effective training techniques such as modeling and feedback (Halle et al., 1979), (b) using a task which is functional and within the ability level of the individuals (Bray et al., in press; Chandler et al., 1974), and (c) using stimuli that are familiar to the participants (Dickson, 1979).

The investigation will be divided into five interrelated phases. In the stimulus familiarization phase, each child's knowledge of functional object pair associations will be assessed. These object pairs will be used in all of the phases. In the store game baseline phase, the communication skills of the severely retarded will be assessed using the store game task devised by Bray et al. (in press). In the two training phases, the students will be trained to be effective communicators using the store game and object pairs to teach the critical component skills of the referential communication event. In the posttest phase, the students will be administered a posttest to assess changes in communicative competence. The final phase, near generalization, will assess the stability of the changes in

communicative competence.

The communication training will compare the importance of training two components of the referential communication event, comparison skills and message formulation. Comparison training will be conducted using similar nonreferents to evaluate the effects of stimulus similarity on communicative effectiveness. Modeling and feedback will be used in all training conditions, since these have been found to be effective in training other language behaviors to the severely mentally retarded (Whitman & Scibak, 1979).

Hypothesis 1: Students trained using a combination of comparison training and training in message formulation will be more effective communicators than students in the other training conditions. This prediction is derived from the component training research conducted with nonretarded children and the communication studies with retarded individuals. Training studies with nonretarded children indicated that communicative effectiveness could be improved by training children to compare the referent to nonreferents (Asher & Wigfield, 1981) and/or by modeling effective messages (Lefebvre-Pinard & Reid, 1980). The studies with the mentally retarded indicated that they may be deficient in their ability to compare the referent to a nonreferent to determine its critical features (Watson, 1978). In addition, severely retarded children who were deficient in formulating messages had their communicative output increased by modeling of an effective communication, in a situation that

required a message to receive a pay-off (Halle et al., 1979).

Hypothesis 2: Relative to the control condition, the total number of communications will be increased in all training conditions. This prediction is based on the communication training studies with severely retarded children (Bricker & Bricker, 1972; Halle et al., 1979; Twardosz & Baer, 1973). These studies indicated that the communcation frequency of severely retarded children could be increased by modeling effective messages and providing feedback about their performance.

Hypothesis 3: Following training, the participants will be able to use the skills they have acquired in a similar task situation. This prediction is based on the training studies which consistently indicated that children were able to transfer the communication skills they learned to tasks similar to the training task (Asher & Wigfield, 1981; Fry, 1966; Halle et al., 1979; Whitman et al., 1972).

Method

Subjects

The participants were 9 severely mentally retarded students from the Jefferson County schools with IQs less less than 35, who meet the baseline performance criteria. The criteria for particiapation was successful completion of the familiarization phase and accuracy of less than 75% in the store game baseline. Each of the students was matched with two other students who had similar performance levels in the baseline phase. Each student from these groups of three was randomly assigned to one of three training conditions.

Materials

Setting and videotapping. A video recorder and camera were used to randomly record 25% of the dyadic interactions during the store game baseline, posttest, and near generalization. These recordings were used to evaluation observer reliability. The store game tests and training sessions was conducted in a small training room.

Store game. The store game baseline, message training, posttest, and near generalization involved the use of a store game. Figure 1 provides a diagram of the position of the experimenters, participants, and equipment used in the store game. The store consists of a table (1.1 x 1.5 m.), an opaque wooden blind (0.8 x 1.1 m.), a storecounter with a plexiglass front, and chairs for the storekeeper and customer.

Object pairs. A pool of 12 object pairs were used and included

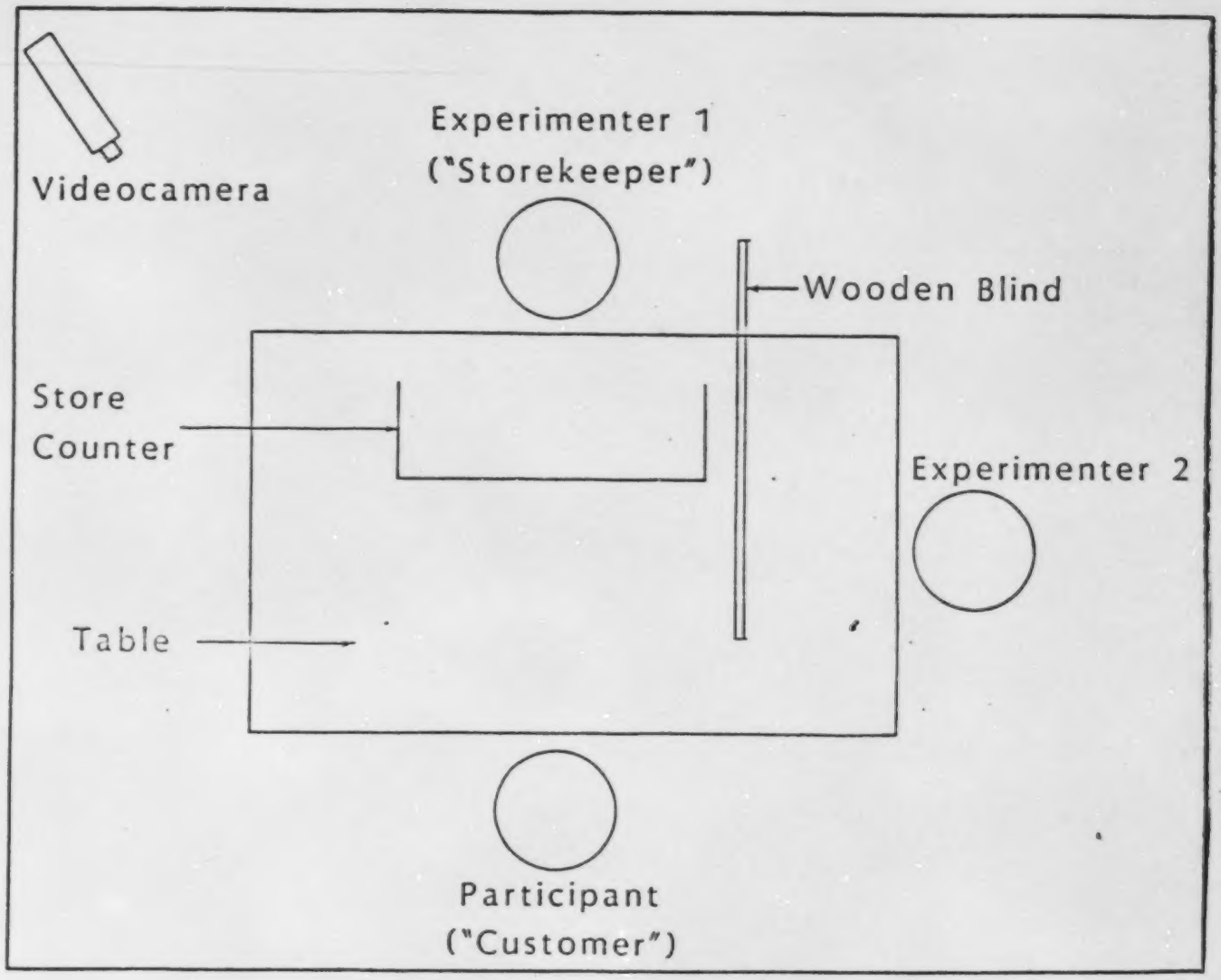

Figure 1. Store game setting and apparatus

items which are functionally associated and can be used to perform a specific act which provided a natural pay-off for each student (e.g., a cup and a pitcher of lemonade). The object shown to the student at the beginning of each trial was called the stimulus object and the object the student was to obtain was called the referent. The list of 12 stimulus-referent pairs is shown in Table 1. The object pairs were counterbalanced across participants and training conditions using a randomly arranged latin square ordering to make the object pair assignments.

Each of the object pairs was also assigned a distractor item that was used with the referent in the store game baseline, comparison training, posttest, and near generalization phases. Each distractor was identical to the referent but either broken or nonusable (e.g., a broken cup). Each student was exposed to the same six distractors in the baseline and posttest phases.

Procedures

Table 2 indicates the actual sequence of the experimental phases in which each of the groups participated. The phases included stimulus familiarization, store game baseline, first training, second training, posttest, and near generalization. The three training conditions were comparison-message, comparison, and contact control.

Stimulus familiarization phase. All students were given the stimulus familiarization pretest. Each student was brought to the training room and seated across from the experimenter. The experimenter then placed on the stimulus referent object pairs

Table 1

Object pairs and distractors.

STIMULUS	REFERENT	DISTRACTOR
puzzle	puzzle piece	broken piece
hamburger ring stack	cheese piece	cheese without hole
form board	circle	broken circle
cylinder	shape box	box without hole
record player	record	broken record
blocks	can	broken can
xylophone	striker	broken striker
small stacker	ring	broken ring
paper	crayon	crayon cover
plate with pudding	spoon	broken spoon
pitcher	cup	broken cup
pegboard	peg	broken peg

Table 2

Treatment phases.

	PHASES					
	Stimulus Familiarization	Store Game Baseline	First Training	Second Training	Posttest	Near Generalization
GROUPS						
COMPARISON-MESSAGE	All Students	All Students	comparison training	message training	All Students	All Students
COMPARISON			stimulus familiarization	comparison training		
CONTROL			stimulus familiarization	stimulus familiarization		

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in front of the student and gave the instruction: "Show me how you use these." Testing on a pair was completed before the next pair was presented. To meet the response criterion, a student had to respond correctly (e.g., attempt to pour the lemonade into the cup) three consecutive times with each of the 12 pairs. A maximum of eight trials was allowed with each pair. Participants who failed to meet the response criterion on one or more of the pairs were excluded.

Store game baseline phase. All of the students participated in the store game baseline. Each student participated as a customer. The students were again brought to the training room and instructed to sit in a chair in front of the storecounter, which was between the student and the storekeeper. They were told: "We would like you to work with us today. We are going to work with a store game. Please try to work as hard as you can." The student customer was then presented with a stimulus object by the experimenter. The stimulus object was placed on the table, on the side of the blind opposite the storecounter, out of view of the storekeeper. The referent and a distractor was placed on the storecounter by the storekeeper (a second experimenter). The experimenter then instructed the student: "Get the one you use with this." The student was expected to communicate which item he/she wanted to the storekeeper using verbalizations and/or gestures. If the student requested one of the objects on the storecounter, it was immediately given to him/her by the storekeeper. The stimulus object was also given to the student at this

time. When the student made a correct choice he/she was permitted to use the object appropriately. If an incorrect choice was made the student was allowed to examine the unpaired objects for 5 seconds. In either case, the objects were then removed and the student was matter-of-factly thanked. When the student did not make a request within 15 seconds of the presentation of the stimulus object, the student was told: "Okay, let's try the next one." That pair was removed and the next presented.

Each student was presented with 6 of the 12 pairs, as determined by the latin square arrangement. These pairs were presented in randomly determined blocks of six. The baseline took place during two sessions, with 12 trials per session. Baseline performance was determined by the number of correct communcations. Total number and type of communications were also noted during baseline.

First training phase. As shown in Table 2, depending on the group, the students were next given either comparison training or stimulus familiarization.

Students in the comparison-message group were given comparison training. They were brought to the training room and seated across the table from the experimenter. The experimenter placed one of the six stimulus objects used in the baseline on the table in front of the student. (The storecounter was not used during comparison training.) The referent and a distractor, highly similar to the referent, were then placed on the table directly behind the stimulus object. The experimenter then instructed the

student: "Get the one you use with this." The student was expected to select the functionally paired item (referent) and perform the correct manipulation as in the store game baseline. If the student failed to make the correct choice, he/she was stopped at the point where the error was first noticed. The experimenter then initiated a correction procedure by saying: "No, this (placing the student's hand on the referent) is used with that (pointing to the stimulus)."

Three consecutive correct choices and manipulations with each of the six pairs was required to complete training. Each student was given a maximum of 25 trials on each pair. Referent and distractor objects were balanced so that each appeared an equal number of times in each position.

During the first training phase, the comparison group and the control group were given a repeated administration of the stimulus familiarization task. The amount of time spent in stimulus familiarization was determined by the amount of time needed by the students in the comparison-message group to reach criterion in comparison training. This matching equated the groups on the amount of exposure to the object pairs and the amount of interaction with the experimenters.

Second training phase. During the second training phase the comparison-message group were given message training. These students were brought to the training room and seated in front of the storecounter, which was between the student and the storekeeper. The students played the game as in the store game baseline,

with the exception that only the referent was placed on the storecounter. If the student did not respond correctly within 10 seconds following the experimenter's instruction ("Get the one you use with this from the storekeeper."), he/she was provided an explicit feedback cue by the storekeeper indicating that he/she should clarify the message ("Which one do you want?"). If the student still did not respond correctly the experimenter modelled the role of the customer using a verbal and a gestural message ("That one," while pointing at the referent). If the student did not respond correctly following the modelling prompt, he/she was physically prompted to provide a gestural message. Physical prompts ranged from partial prompts, to full physical prompts, in which the arm of the student was guided into a pointing message. When the student delivered a message the storekeeper and experimenter praised that behavior and gave the stimulus and referent to the student to manipulate. Training continued until each student participated in three consecutive successful communications with each pair or a maximum of 25 trials per pair. Position of the referent on the storecounter was randomly varied to prevent the student from developing a position.

During the second training phase the comparison group was given comparison training as described previously. The control group continued in stimulus familiarization.

Posttest. A posttest was then conducted for all groups. The students participated as in the store game baseline. The number of correct communications, total, and type of communications

were recorded.

Near generalization. This phase was conducted in the same manner as the posttest with the exception that untrained pairs were used. These pairs were those used during the stimulus familiarization but not used during training. Again, number of correct communications, total, and type of communication were recorded.

Results

Training of the students was accomplished in a relatively brief period of time. Each student participated in approximately 8 sessions (range 6-12), including test sessions. Students averaged 1.8 sessions per training condition (range 1-3 sessions). Students given comparison training completed it in an average of 1.6 sessions. Message training took an average of 3 sessions. Each of these sessions lasted 15 to 20 minutes.

The students involved in training were given an average of 28 trials per session (range 14-46 trials). Mean trials per session for message training was 34 (range 18-42) and 25.8 for comparison training (range 14-46). The average number of trials to criterion for comparison training was 68. The average trials to criterion for comparison training was 43. These results indicated that the procedures used were adequate in teaching the two components of the communication process under consideration.

The communication frequency and accuracy data for the training groups is presented in Figure 2. Students receiving both comparison and message training had the largest gains in communication accuracy following training. These students also had impressive increases in communication frequency. The students receiving only comparison training also made small gains in accuracy of responding in the near generalization phase. While they made sizable gains in communication frequency, their performance did not improve as much as the comparison-

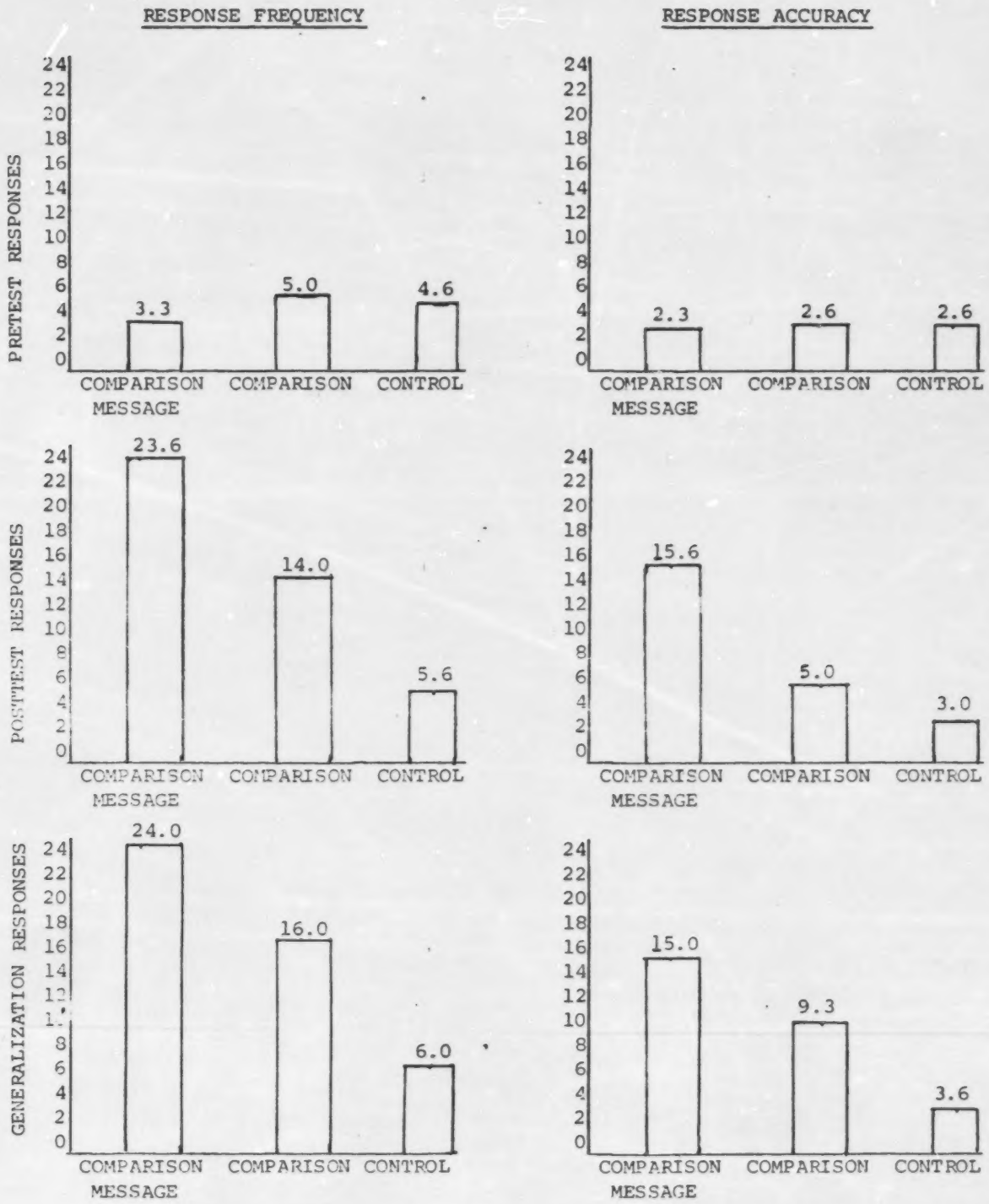

Figure 2. Mean communication frequency and accuracy data for three training conditions (comparison-message, comparison, and control) in the three testing phases of the communication study.

message group. Students in the contact control group changed very little from their baseline performance.

Interrater reliability scores were highly acceptable (.90-.95) and indicated that reliable communication responses were obtained.

Discussion

Based on the results of this investigation it can be concluded that the communicative competence of severely retarded school children can be improved by teaching them two critical components of the communication event. In this case the communication event was a store game task and the components taught were formulation of a message and comparing the referent to a similar nonreferent. Students who were taught both of these components had the greatest gains in communicative competence. However, all children trained had increases in communicative frequency. These gains were maintained in a store game when new items were used with the students. This indicates that they did not learn object specific behavior but actually learned transferable communicative behaviors.

The most curious finding was that the children who were taught both message formulation and comparing the referent and a nonreferent, even though they were able to perform the comparison accurately, communicated with only 63 percent accuracy. While this is consistent with the results of communication training studies with nonretarded young children (Asher & Wigfield, 1981), the reason for this relatively poor performance is not clear. It could be that the children are not sure when to use their comparison skills (Whitehurst & Sonnenschein, 1981). It might be that they are not familiar with having to rely on their own communicative competence to obtain what they want, since they are frequently placed in situations where all of their needs are

satisfied without the need for them to communicate (Bray et al., in press).

On a theoretical level, this study provided information concering the components of the communication event which affect one's ability to become an effective communicator. It also raised questions regarding the limited use of known comparison skills when severely retarded children attempt to communicate.

On a practical level, this project provided suggestions regarding how the classroom teacher might structure interactions with mentally retarded students and how the features of a special classroom might be arranged to develop and enhance communication skills. For example, by using incidental teaching and the delay technique employed both in this study and by Halle et al. (1981). More specifically, this study provided a model for developing methods and techniques for teaching communication skills to the severely mentally retarded.

Reference Note

1. Shantz, C., & Steinlauf, B. Perspective-taking and decentration abilities in children. Unpublished manuscript, Wayne State University, 1976.

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